

CLAIMS

What is claimed is:

1. (Previously presented) A process for scavenging hydrogen sulfide and/or mercaptans from a liquid or gaseous stream which comprises bringing the stream into contact with a scavenging effective amount of at least one scavenger selected from the group consisting of:

- (i.) a 1,3,5-trisalkylamino hexahydro-1,3,5-triazine derivative;
- (ii.) a nitrogen heterocyclic compound of the formula:

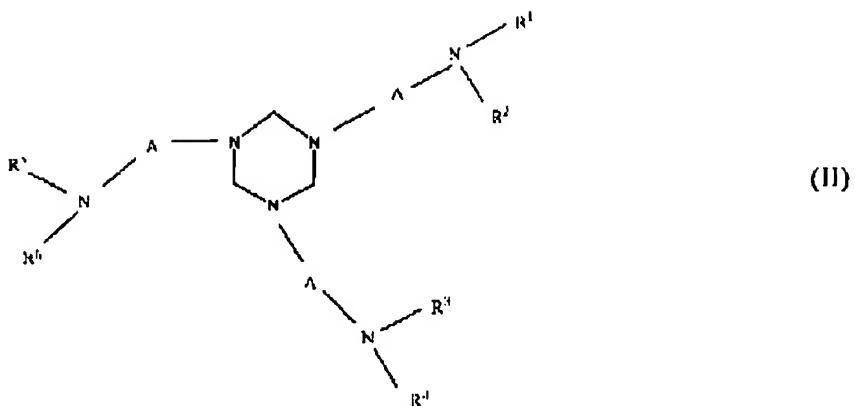


wherein Y is -N or -O and R⁸ is an aminoalkyl group containing between 2 to 4 carbon atoms;

- (iii.) an amine oxide; and
- (iv.) an aliphatic or aromatic polyamine

and thereby scavenging hydrogen sulfide and/or mercaptan from the liquid or gaseous stream.

2. (Previously presented) The process of Claim 1, wherein the at least one scavenger comprises a 1,3,5-trisalkylamino hexahydro-1,3,5-triazine derivative of the formula:



wherein each Δ is independently selected from the formula $-(\text{CH}_2\text{R}^7)_x$ wherein x is from 1 to about 6 and each R^1 , R^2 , R^3 , R^4 , R^5 , R^6 and R^7 is independently selected from -H or a C₁-C₆ alkyl.

3. (Original) The process of Claim 2, wherein the 1,3,5-trisalkylamino hexahydro-1,3,5-triazine derivative is 1,3,5-tris[3-(dimethylamino)propyl] hexahydro-1,3,5-triazine, 1,3,5-tris[2-(dimethylamino)ethyl] hexahydro-1,3,5-triazine, 1,3,5-tris[3-(diethylamino)propyl] hexahydro-1,3,5-triazine or 1,3,5-tris[2-(diethylamino)ethyl] hexahydro-1,3,5-triazine.

4. (Previously presented) The process of Claim 1, wherein the at least one scavenger comprises the nitrogen heterocyclic compound wherein the aminoalkyl group is 2-aminoethyl or 2-hydroxyethyl.

5. (Previously presented) The process of Claim 1, wherein the at least one scavenger comprises morpholine bottoms.

6. (Currently unclaimed) The process of Claim 1, wherein the at least one scavenger comprises an amine oxide of the formula $(\text{R}_1)(\text{R}_2)(\text{R}_3)\text{N}-\text{O}$ wherein R_1 is an alkyl, alkenyl, alkylarylkylene, alkenylarylkylene, alkylaminoalkylene, alkynylaminoalkylene, alkylamidoalkylene, or alkenylamidoalkylene group, wherein each of said alkyl groups contains up to about 24 carbon atoms and may be branched or straight chained and saturated or

unsaturated, and wherein said alkylene groups have from about 1 to about 6 carbon atoms; and R₂ and R₃ are independently aliphatic chains having about 1 to about 30 carbon atoms; atoms.

7. (Currently amended) The process of Claim 6, wherein the amine oxide is of the formula $\text{RCONHCH}_2\text{CH}_2\text{CH}_2\text{N}^+(\text{CH}_3)_2\text{O}^- (\text{RCONHCH}_2\text{CH}_2\text{CH}_2)(\text{CH}_3)_2\text{N}\rightarrow\text{O}$ wherein R is a radical selected from the group consisting of decyl, cocoyl, lauryl, cetyl and oleyl.

8. (Previously presented) The process of Claim 21, wherein the at least one scavenger is an alkanolamine selected from the group consisting of monoalkanolamines, dialkanolamines and trialkanolamines and mixtures thereof.

9. (Previously presented) The process of Claim 21, wherein the alkanolamine is selected from the group consisting of monoethanolamine, monomethanolamine, monopropanolamine, monobutanolamine, monopentanolamine, monohexanolamine, monoheptanolamine, monooctanolamine, monononanolamine, ethyldiethanolamine, dimethanolamine, methanolethanolamine, diethanolamine, methanolpropanolamine, ethanolpropanolamine, dipropanolamine, methanolbutanolamine, ethanolbutanolamine, propanolbutanolamine, dibutanolamine, dipentanolamine, dihexanolamine, diheptanolamine, dioctanolamine, trichanolamine and tripropanolamine.

10. (Previously presented) The process of Claim 1, wherein the at least one scavenger comprises a polyamine containing at least two amine groups per molecule.

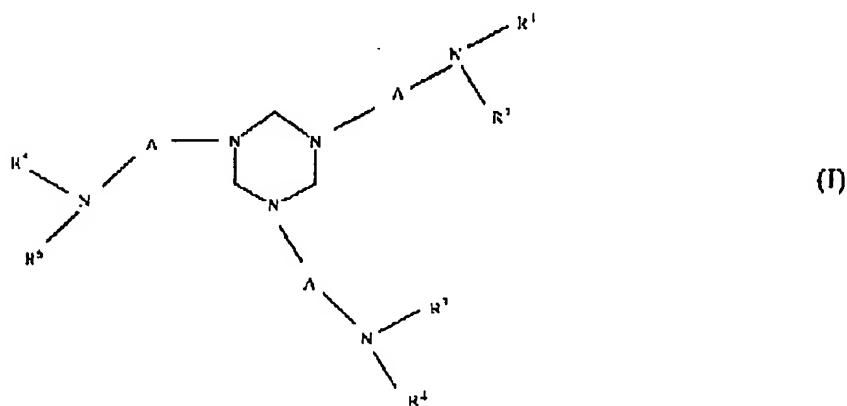
11. (Previously presented) The process of Claim 10, wherein the polyamine is a polyalkylene or aromatic polyamine having from 1 to about 4 primary or secondary amine groups per molecule of the formula $-\text{N}(\text{R}_8)(\text{R}_9)$ wherein each R₈ and R₉ are independently selected from the group consisting of -H and a C₁-C₆ alkyl, wherein each alkylene group contains between from 2 to about 8 carbon atoms.

12. (Original) The process of Claim 10, wherein the polyamine is dialkylene triamine, trialkylene tetraamine or a pentaalkylene hexamine or a mixture thereof.

13. (Original) The process of Claim 10, wherein the polyamine is N, N'-di-sec-butyl-p-phenylenediamine, tris-(2-aminoethylamine), diethylene triamine, trimethylene tetraamine, pentaethylene hexamine, ethylenediamine, propylenediamine, triethylenetetramine, tetrathylenepentamine, tetrabutylenepentamine, hexaethyleneheptamine, hexapentyleneheptamine, heptaethyleneoctamine, octaethylenenonamine, nonaethyleneundecamine, decaethyleneundecamine, decahexyleneundecamine, undecaethyleneundodecamine, dodecaethylenetridecamine, and tridecaethylenetetradecamine.

14. (Previously presented) A process for scavenging hydrogen sulfide and/or mercaptan contaminants from a hydrocarbon stream, comprising mixing the hydrocarbon stream with a scavenging effective amount of at least one scavenger selected from the group consisting of:

(i.) 1,3,5-trisalkylamino hexahydro-1,3,5-triazine derivative of the formula:



wherein each A is independently selected from the formula -(CHR⁷)_x wherein x is from 1 to about 6 and each R¹, R², R³, R⁴, R⁵, R⁶ and R⁷ is independently selected from -H or a C₁-C₆ alkyl;

(ii.) nitrogen heterocyclic compound of the formula:



wherein Y is -N or -O and R⁸ is an aminoalkyl group containing between 2 to 4 carbon atoms.

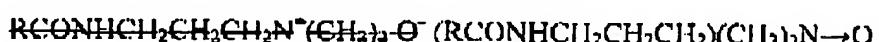
(iii.) amine oxide of the formula (R₁)(R₂)(R₃)N→O wherein R₁ is an alkyl, alkenyl, alkylarylalkylene, alkenylarylalkylene, alkylaminoalkylene, alkenylaminoalkylene, alkylamidoalkylene, or alkenylamidoalkylene group, wherein each of said alkyl groups contains up to about 24 carbon atoms and may be branched or straight chained and saturated or unsaturated, and wherein said alkylene groups have from about 1 to about 6 carbon atoms; and R₂ and R₃ are independently aliphatic chains having about 1 to about 30 carbon atoms; and

(iv.) aliphatic or aromatic polyamine

and thereby scavenging hydrogen sulfide and/or mercaptan contaminants from the hydrocarbon stream.

15. (Previously presented) The process of Claim 14, wherein the at least one scavenger comprises a 1,3,5-trisalkylamino hexahydro-1,3,5-triazine derivative selected from the group consisting of 1,3,5-tris[3-(dimethylamino)propyl] hexahydro-1,3,5-triazine, 1,3,5-tris[2-(dimethylamino)ethyl] hexahydro-1,3,5-triazine, 1,3,5-tris[3-(diethylamino)propyl] hexahydro-1,3,5-triazine and 1,3,5-tris[2-(diethylamino)ethyl] hexahydro-1,3,5-triazine.

16. (Currently amended) The process of Claim 14, wherein the at least one scavenger comprises at least one amine oxide of the formula:



wherein R is a radical selected from the group consisting of decyl, cocoyl, lauryl, cetyl and oleyl.

17. (Previously presented) The process of Claim 23, wherein the at least one scavenger is an alkanolamine selected from the group consisting of monoethanolamine, monomethanolamine, monopropanolamine, monobutanolamine, monopentanolamine, monohexanolamine, monoheptanolamine, monooctanolamine, monononanolamine, ethyldiethanolamine, dimethanolamine, methanolethanolamine, diethanolamine, methanolpropanolamine, ethanolpropanolamine, dipropanolamine, methanolbutanolamine, ethanolbutanolamine, propanolbutanolamine, dibutanolamine, dipentanolamine, dihexanolamine, diheptanolamine, dioctanolamine, triethanolamine and tripropanolamine.

18. (Previously presented) The process of Claim 14, wherein the at least one scavenger comprises a polyamine containing at least two amine groups per molecule.

19. (Original) The process of Claim 18, wherein the polyamine is a polyalkylene or aromatic polyamine having from 1 to about 4 primary or secondary amine groups per molecule.

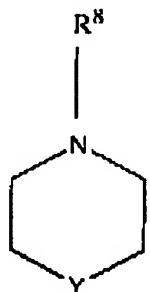
20. (Previously presented) The process of Claim 14, wherein the at least one scavenger comprises a polyamine selected from the group consisting of N, N'-di-sec-butyl-p-phenylenediamine, tris-(2-aminoethylamine), diethylene triamine, trimethylene tetraamine, pentaethylene hexamine, ethylenediamine, propylenediamine, triethylenetetramine, tetraethylenepentamine, tetrabutylenepentamine, hexaethylenepentamine, hexapentyleneheptamine, heptaethyleneoctamine, octaethyleneoctamine, nonaethyleneundecamine, decaethyleneundecamine, decahexyleneundecamine, undecaphenylenedodecamine, dodecaethylenetridecamine and tridecaethylenetetradecamine.

21. (Previously presented) A process for scavenging mercaptans from a liquid or gaseous stream which comprises bringing the stream into contact with a scavenging effective amount of an alkanolamine of the formula $(R_4)(R_5)N(R_6)OH$ wherein R_6 is a C₁-C₁₂ linear or branched alkyl group, R_4 and R_5 are independently selected from hydrogen, R₆ or R₇-OH, and R₇ is methylene or a C₂-C₈ linear or branched alkylene group and thereby scavenging mercaptans from the liquid or gaseous stream.

22. (Previously presented) The process of Claim 21, wherein the liquid stream is selected from the group consisting of liquefied petroleum gas, crude oil, petroleum residual oil and heating oil.

23. (Currently amended) A process for scavenging hydrogen sulfide and/or mercaptans from a liquid or gaseous stream which comprises bringing the stream into contact with a scavenging effective amount of at least one scavenger selected from the group consisting of a:

- (i.) 1,3,5-trisalkylamino hexahydro-1,3,5-triazine derivative;
- (ii.) nitrogen heterocyclic compound of the formula:



(I)

wherein Y is -N or -O and R⁸ is an aminoalkyl group containing between 2 to 4 carbon atoms;

- (iii.) amine oxide;

(iv.) alkanolamine of the formula (R₄)(R₅)N(R₆)OH wherein R₆ is a C₁-C₁₂ linear or branched alkyl group, R₄ and R₅ are independently selected from hydrogen, R₆ or R₇-OH, and R₇ is methylene or a C₂-C₈ linear or branched alkylene group; or

- (v.) aliphatic or aromatic polyamine

and thereby scavenging hydrogen sulfide and/or mercaptans from the liquid or gaseous stream wherein the scavenger is added neat or diluted with a solvent selected from the group consisting of alcohols, esters, benzene, benzene derivatives, acetone, kerosene and aromatic naphtha.